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ARMY AVIATION TEST BOARD FORT RUCKER ALA  
MILITARY POTENTIAL TEST OF A UH-1( )/AH-1G FLIGHT AND GROUND ID--ETC(U)  
NOV 68

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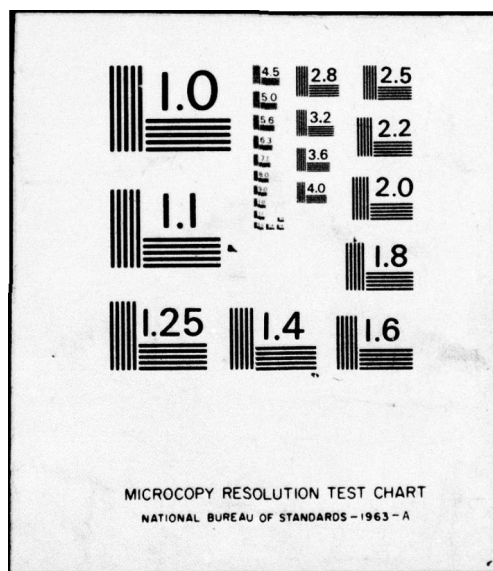
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DEPARTMENT OF THE ARMY  
✓ UNITED STATES ARMY AVIATION TEST BOARD  
Fort Rucker, Alabama 36360

STEBG-TD

SUBJECT: Final Report of Military Potential Test of a UH-1( )/AH-1G Flight and Ground Idle Stop, USATECOM Project Number 4-9-5000-01

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1. REFERENCE

Letter, AMCPM-IR-T, Headquarters, US Army Materiel Command, 9 September 1968, subject: "Military Potential Test of a UH-1/AH-1G Flight and Ground Idle Stop," with 1st Indorsement, AMSTE-BG, Headquarters, US Army Test and Evaluation Command, 15 October 1968.

2. BACKGROUND

The standard power control system on UH-1( ) and AH-1G helicopters does not provide the pilot a precise position of the throttle for starting. There is a possibility of getting a hot start, or a hung start, if the throttle is not accurately positioned. The US Army Aviation School and the US Army Board for Aviation Accident Research (USABAAR) expressed a need for a throttle position detent/stop below the flight idle position which would positively identify the ground idle position for starting. The US Army Test and Evaluation Command directed the US Army Aviation Test Board (USAAVNTBD) to conduct a military potential test of the UH-1( )/AH-1G flight and ground idle stop to determine if an accurately positioned throttle is necessary on the T53-L-11/13 engines to avoid hot starts and if the test hardware provides an accurate throttle position (reference 1).

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### 3. DESCRIPTION OF MATERIEL

The flight and ground idle stop has a slider that acts as the stop. This slider stop provides a definite position for flight and ground idle, and, by its sliding, reduces the amount of throttle movement between flight and ground idle power settings. The primary difference in its operation as compared to the standard stop is the need to actuate the solenoid to go from ground idle to higher throttle settings. Installation of the flight and ground idle stop results in negligible change in aircraft weight and balance. (See inclosure for a photograph of the flight and ground idle stop.)

### 4. OBJECTIVES *were*

*To determine:*

(1) If an accurately positioned throttle is necessary on the T53-L-11/13 engines to avoid hot starts.

(2) Whether the UH-1( )/AH-1G flight and ground idle stop provides accurate throttle positioning for a flight idle and for a ground idle position.

(3) Whether the installation or design of the flight and ground idle stop creates a safety hazard not present with the standard stop installed.

### 5. SCOPE AND METHOD

a. The USAAVNTBD conducted this Category II military potential test at Fort Rucker, Alabama, during the period 25 October through 25 November 1968. The flight and ground idle stops were installed in two of each of the following helicopters:

#### Helicopter

UH-1B

#### Engine Installed

T53-L-9A



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<u>Helicopter</u>	<u>Engine Installed</u>
UH-1B	T53-L-11
UH-1C	T53-L-11
UH-1D	T53-L-9A
UH-1D	T53-L-11
UH-1H	T53-L-13
UH-1M	T53-L-13

The stop was installed using applicable organizational maintenance manuals to obtain required clearances.

b. The flight and ground idle stop was adjusted for proper flight idle positioning. The difference in  $N_1$  r.p.m. percent at flight and ground idle was checked and recorded, and a check was made throughout the full range of operation from full power to shutdown.

c. The solenoid mounting on the stop and installation/adjustment of the solenoid plunger were inspected for slippage and for travel of the plunger into the slider slot.

#### 6. SUMMARY OF RESULTS

a. It could not be determined whether the flight and ground idle stop would prevent or reduce hot starts caused by improper throttle positioning.

b. The flight and ground idle stop would not fit either the AH-1G or UH-1A Helicopters.

c. The differences between  $N_1$  r.p.m. at flight idle and ground idle were:

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	<u>Flight Idle (percent)</u>	<u>Ground Idle (percent)</u>	<u>Difference (percent)</u>
UH-1H and UH-1M with T53-L-13 engine	70	67	3
UH-1B, UH-1C, and UH-1D with T53-L-11 engine	58	45	13
UH-1B with T53-L-9A engine	58	45	13
UH-1D with T53-L-9A engine	58	52	6

d. No changes or restrictions to full throttle movement were observed, and use of the flight and ground idle stop presented no unusual problems.

e. When the clearance between the solenoid plunger and the stop was adjusted in accordance with applicable technical manuals, the solenoid plunger did not extend into the slider slot because the plunger had a short, limited movement stroke and the serrated mounting surface of the stop prevented slippage after installation.

f. There were no safety hazards created by installation of the flight and ground idle stop.

g. No aborted starts or overtemperature conditions occurred in 42 starts.

## 7. DISCUSSION

The answer to the requirement to determine if accurate positioning of the throttle is necessary on T53-L-11/13 engines to avoid hot starts was not determined during this limited test. Apparently statistical data available to USABAAR indicates a potential problem and the need for positive positioning of the throttle prior to initiation



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of a start. If such is determined to be the case, then the flight and ground idle stop tested can satisfactorily meet that requirement, but its application is limited in that it does not fit the UH-1A and AH-1G Helicopters.

#### 8. CONCLUSIONS

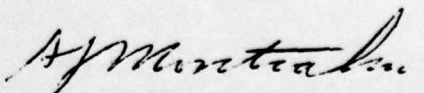
- a. The flight and ground idle stop has military potential.
- b. The flight and ground idle stop provides a definite and accurate throttle position for starting on the UH-1B/C/D/H/M Helicopters.
- c. Installation or design of the flight and ground idle stop does not create a safety hazard.
- d. The flight and ground idle stop does not fit the AH-1G and UH-1A Helicopters.

#### 9. RECOMMENDATION

If this item is adopted for Army use, it should be modified to fit all UH-1( )/AH-1G helicopters to provide a standardized starting procedure for these aircraft.

FOR THE PRESIDENT:

1 Incl  
as

  
A. J. MONTCALMO  
1LT, AGC  
Acting Adjutant

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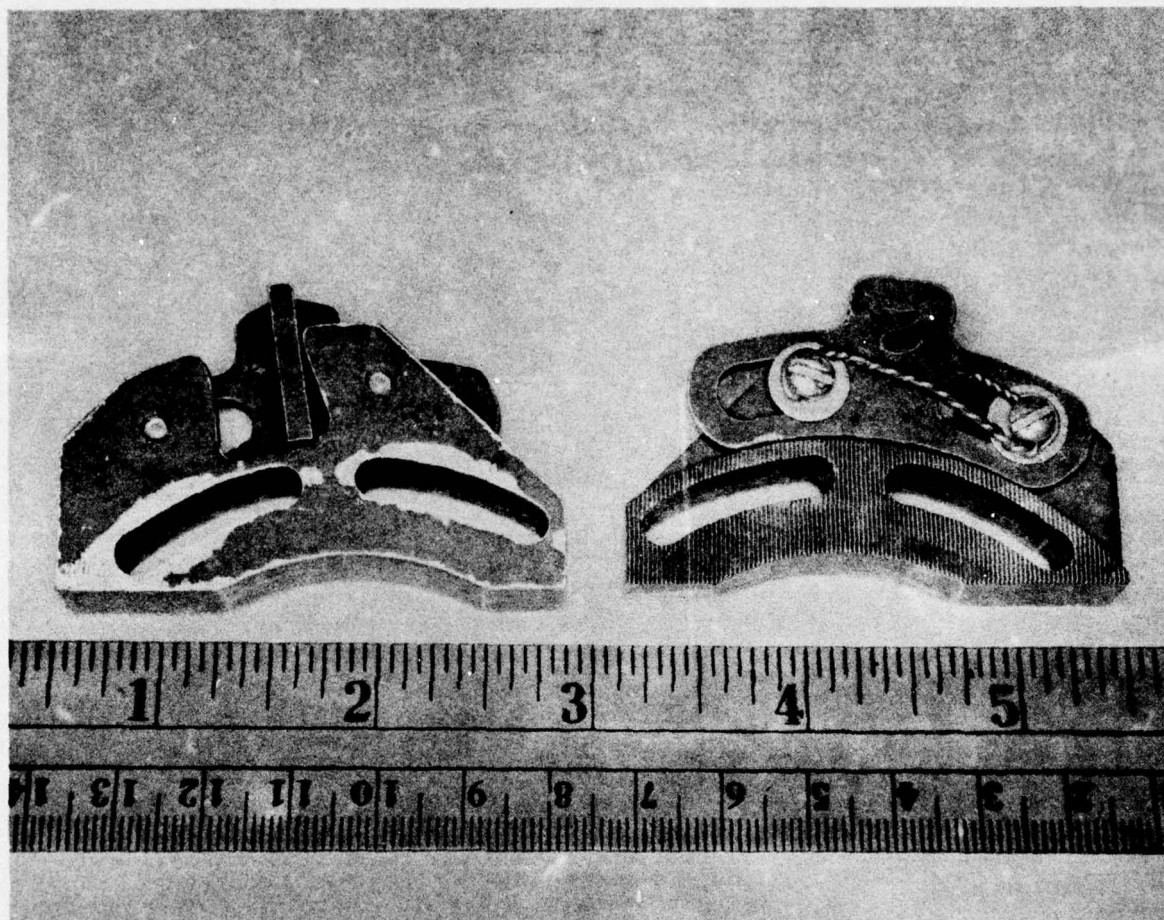
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INCLOSURE 1

